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Sustaining Urban Growth through Innovative Capacity: Beijing and Shanghai in Comparison*

By

WANG Jici

TONG Xin

Department of Geography

Peking University

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ABSTRACT

The paper examines the diverse prospects of innovative sectors in Beijing and Shanghai using available indicators and data collected for this study through surveys. Beijing is the first choice for companies locating in China but foreign employees prefer Shanghai for living convenience and cultural amenities. While Shanghai lags behind Beijing in knowledge creation and the generation of startup companies in the innovative sectors, it takes the lead in the commercialization of technological innovations and the development of creative cultural industries. The municipal authorities of Beijing and Shanghai have improved the innovation environment of the cities, but certain elements still stunt the growth of innovative industries, which cannot be removed easily. Three kinds of knowledge-intensive enterprises included in innovative sectors in the survey are high-tech manufacturers, knowledge intensive business services and creative content providers. The survey found that the clustering of the firms arose from the attraction of preferential policies and the purchase by governments or state-owned enterprises of information technology products. The survey shows that interaction among firms is inadequate in the knowledge-based industrial clusters in both Beijing and Shanghai. Hence, it may be some time before clustering leads to substantial gains in collective efficiency for innovative industry in Beijing and Shanghai.

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I. Introduction

The aim of this paper is to identify the role of urban policies in augmenting the natural advantages of cities to initiate virtuous spirals resulting in the emergence of innovative industrial clusters. The paper compares the efforts of Beijing and Shanghai to develop knowledge-based industries. It concludes that the innovative sectors in Beijing and Shanghai are still small but very dynamic with bright prospects. However, they are developing in different ways. The problem is the gap between the intention of public policy-makers and the real need of innovators living in the cities, particularly when public policy has to balance several controversial objectives in urban development.

The research was based on field studies conducted in Beijing and Shanghai from August 2003 to April 2004, and an extensive review of published material relevant to this topic. The primary sources were quasi-structured interviews with company executives in 100 firms (50 in Beijing and 50 in Shanghai). The firms interviewed varied greatly in size and sector, but all were engaged in producing creative outputs covered by intellectual property (IP) laws or in knowledge-based value adding services for businesses. The interviews inquired about the internal and external factors influencing the innovative capacity of firms, such as knowledge workers, IP laws, cluster dynamics, service businesses, innovative infrastructure, etc., in each city.

The next section presents the state-led policy directions that provide the background for the innovation needs of Beijing and Shanghai. The third section gives an overview of their economic development, as well as provides selected indicators on innovative capacity, such as R&D investment, creative industries, high-tech outputs, etc. based on published statistics. It is followed by an assessment of the quality of the business environment in each city from the perspective of the enterprises. This is followed by a critical discussion of the effects of government policies targeting high-tech industries and knowledge-based economy, including preferential policies toward key sectors, special treatment for inducing human talent, planning of parks for specific creative sectors, and so on.

II. State-led Policy Directions: High tech as economic high hope

Following China's opening to the outside world, 1983's forum on "the challenge of world new-tech revolution and our countermeasure" held by the State Council quickly embraced the concept of a "new-tech revolution," which had been inspired by the writings of the American futurist Alvin Toffler. It helped shape the public opinion for China's technology-led strategy.[1]

The deepening of the post-Mao science and technology (S&T) reforms and the implementation of the high-tech supporting Torch Program which began in 1988 have helped sprout more than 150 high- and new-tech industrial development zones (HNIDZ) all over the country. Among them, 53 are at the national level. They nurse over 10,000 high- and new-tech firms. The purpose of the high- and new-tech industrial development zones set by the S&T Commission is: "Relying on the S&T force of China, promoting the commercialization and industrialization of S&T results, enhancing China's competitiveness in the world". As the computer technology centre, Beijing generates by far the most tech-based revenue, while Shanghai demonstrates its strength as an export centre (Wallcott, 2003). In the same period, 49 economic and technological development zones (ETDZ) at the national level were set up. They have also attracted many tech-based firms.

The national policies in China target the development of a knowledge-based economy including investments in infrastructure of innovation, such as establishing and improving intellectual property laws, giving preferential treatment for research and development (R&D) investment in both the public and private sectors, attracting and helping talent to start businesses, and providing special assistance in selected technological fields, such as software, integrated circuit (IC), bio-tech industry, and so on. At the same time, the policies also include investments in the infrastructure of efficiency (public services, transportation, telecom, zoning and regulation).

By the end of 1997, China's leaders approved a plan, the National Knowledge Innovation Project of the Chinese Academy of Sciences (CAS), to carry out a drastic re-organization of its 123 institutes. The plan will be implemented in three phases over the next 13 years. Substantial amounts of new money have been directed into selected research areas and regions, with hundreds of new staff being recruited from overseas. In line with government priorities, the

[1] Administration Office of Torch Program, State Science and Technology Commission of P.R.C (1991):"Introduction to China High and New Technology Industry Development Zones".

academy aims to "embrace the era of knowledge economy" and "build up a national innovative system".

During the 16th Congress of Chinese Communist Party held in 2003, China's authorities decided on "promoting industrial restructuring and upgrading through a New Path toward Industrialization (*xinxing gongyehua daolu*), which is characterized by upgrading technologies, improving economic efficiencies, lowering resource consumption, reducing environmental pollution, and fully developing human resources." And in the Tenth Five-year National Social and Economic Development Plan (2000-2005), one of the most important strategies is improving the national industrial competitiveness through informatization (*xinxihua*).

The Scientific Development Blueprint for the Tenth 5-Year Plan period (2001-2005), which has been officially announced by the State Development Planning Commission, stresses the development of high-tech industries, such as computer software, integrated circuits, and pharmaceuticals. By 2005, high-tech industries are expected to make up 6 percent of the country's gross domestic production, compared with 4 percent in 2001, according to the blueprint.

However, the requirements of an innovation system are stringent. China needs a good, broad-based educational system and a system of innovation to erase the legacy of central planning. For example, most key technological upgrading programs are undertaken by the state research sector and few enterprises are involved. Many enterprises have poor product development abilities and small R&D spending. Since enterprises undertaking technological upgrading will be granted loans to buy advanced technology, scientific research institutes are usually ill informed about the latest developments. In terms of technology import, duplicate introduction is also common. The government still interferes too much in the management of enterprises. The intermediary agencies, which provide major services for small firms in turning high-tech research findings into products, are still incapable of meeting the growing demand of technological innovation.

The first and most important part of the infrastructure of innovation for China is intellectual property law. China has not yet introduced effective protection through IP laws. As a result, the traditional cultural goods and services are stagnating in spite of "modernization" throughout the country, especially in cities. And the outcomes of the national high tech industries, such as IC and software, medicines, biotech products, which represent the modern

sectors, seldom come from new creative ideas. Without effective protection from the IP laws, people can seldom benefit economically from their creative activities.

Information technology (IT) industry

In terms of scale, China's IT sector is among the top three in the world. China has become the world's biggest producer of mobile phones, DVD players, color TV sets, program controlled switches and other electronic equipment. The rapid development of the IT industry has created a large number of job opportunities. About 6.2 million Chinese worked in the industry in 2002.[2]

The spatial change of the sector can be attributed to the transition from planned economy to market economy. At the beginning of the economic reform, the location decision of IT industry in China was made by the central government. In July 1986, the Ministry of Electronics Industry (MEI) decided to select Beijing, Shanghai, Jiangsu, and Guangdong as the national production bases. The authority of Beijing has put emphasis on the reconstruction of planned traditional electronics bases, such as the Jiuxianqiao electronics district, where China's first computer was born in the 1960s. However, beyond the expectation of the government, new IT centers, such as Beijing's Zhongguancun and the city of Shenzhen emerged as a consequence of market forces.

A number of electronics firms were established by intellectuals in the Zhongguancun Street of Beijing's Haidian district in the mid 1980s. These and the firms that have followed are spin-offs from state-run research institutes and universities, such as the Chinese Academy of Sciences (CAS), Peking University and Tsinghua University (See Conroy, 1992; Wang and Wang, 1998).

More recently, the booming Internet economy in China has made high-tech firms shift from hardware manufacturing to Internet-based application software development and information services. The fast developing telecommunication sector has accelerated the process. Since 1995 the Ministry of Science and Technology has begun to set up software development bases. There are 19 National Torch Software Development Bases established including the Beijing Software Park and the Shanghai Software Park. In addition, the State Information Technology Coordination Group was set up in 1996. At each stage specific goals have been established to use information resources, to build a network, and to develop information industry.

[2] China's IT industry Maintains High Growth. http://english.people.com.cn/200210/20/eng20021020_105361.shtml

The year 1998 saw the setting up of the Ministry of Information Industry of China, to reform the regulations, create the technical standards and promote the development of the market for the development of IT industry. One outcome is that the Chinese telecoms industry experienced unprecedented reform, from monopoly to opening, from integration of government administration with telecom operators to being run independently by telecom operators plus effective regulation of the government.

In order to upgrade the IT industry, the State Council of China issued Policies on Encouraging the Development of Software Industry and IC industry in 2000 to increase the creativeness and international competitiveness of Chinese IT industry. The document outlines policy support for the software industry through investment, financing, taxation, industrial technology, exports, accreditation of software enterprises, and protection of intellectual property rights.

For investments by IC manufacturers whose amount of investment exceeds 8 billion Yuan or whose IC wire width is less than 0.25 μ m., the policies offer preferential terms in taxation and other related aspects, including preferential treatment for establishing jointly invested or wholly foreign-invested IC production enterprises by foreign investors, preferential tax policies, and exemption of tariffs and import-stage value-added tax on self-use raw material and consumption goods for production imported by manufacturers.

Biotech and pharmaceutical industry

The Chinese government attaches much importance to the development of modern life sciences, as the government believes that biotechnology will help solve the most urgent problems associated with the population, food supply, health care and environmental protection.

Since the seventh 5-year plan (1986-1990), the Chinese government has been implementing a couple of programs that prioritize the development of biotechnology. The programs cover a wide spectrum in basic research, high-tech development as well as industrialization. So far in China, three centers sponsored by the central government, in round numbers 30 state laboratories, institutes in 30 colleges and 200 enterprises, are engaged in biomedical research and development. The biotech and pharmaceutical industry is concentrated in five cities: Shijiazhuang, Shanghai, Shenzhen, Beijing and Guangzhou. Biotech and pharmaceutical industry is listed among the high-tech industries in the Tenth 5-year Plan

receiving national support. Besides pursuing development of cloning and gene technologies, the government also stresses the importance of upgrading the technologies of Chinese herbal medicines.

New attention to cultural industry

In recent years, the development of the public media, publishing, tourism, sports, performing arts, and so on, are drawing public attention, for three reasons:

First, many traditional non-commercial goods provided by the government under the central planning system, such as culture products, education, public media and performing arts, have lost most of the financial support provided by public funds in the transition to the market-based economy. They have to survive by "selling" their products or services on the market as other producers do. Such market oriented transition has resulted in the commercialization of the culture sectors in China.

Second, as average incomes are increasing in China, the demands for diversified and high quality culture goods and services are rising continuously. Families spend more money on leisure time. The major function of the culture sectors is no longer ideological but increasingly for the purpose of entertainment. Such a commercial environment is crucial for developing a mass media industry in China.

Third, the market share of culture products from overseas is increasing in the domestic market, especially in the mass consuming fields such as films, advertisement, TV programs. More and more global media groups, such as Disney, Time Warner, News Group, have come to China. The capital-intensive nature of the competition in the cultural industry has frustrated many local traditional small and medium enterprises (SMEs). The question of how to protect and support the development of local culture industries has become an urgent concern of policy makers in China.

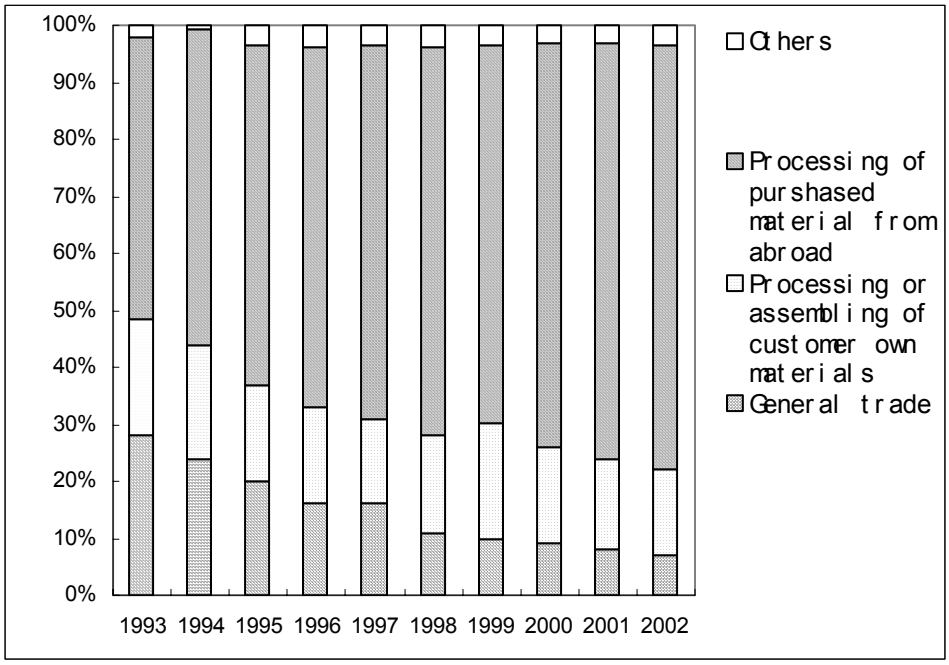
The national gross production of culture industry was RMB 600 billion in 2002. It is rising by at least 12% each year, and it is estimated that the national gross production of the culture industry will reach RMB 1,000 billion in 2005, which is 8 % of GDP.

As the following sections will show, Beijing and Shanghai are China's two pre-eminent cultural centers. They could be joined by Shenzhen. As a young city with very little ideological baggage, an immigrant city with a pool of different ideas, and proximity to Hong Kong and

closer contacts with the outside world, Shenzhen has opportunities for developing the cultural industry. Early in November of 2004, the successful First Shenzhen International Cultural Industry Fair took place. It was hosted by the Cultural Industry Department of the Ministry of Culture of the PRC, the Department of Culture, Guangdong Province, the Administration of Radio, Film and TV of Guangdong Province, the Press and Publication Bureau of Guangdong Province, and the Shenzhen Municipal Government.

China's IT market, pharmaceutical market, cultural market and others are becoming more and more attractive for foreign investors following reform measures. Foreign investment is allowed into these sectors. China's entry into the World Trade Organization will also help accelerate the restructuring.

Figure 1: The trade structure of export of high-tech industrial products (1993-2002)



Source: National Economic and trade commission (ed.) (2003): *Zhongguo Gongye Jingzhengli* (China's Industrial Competitiveness), China Machine Press, page 77.

There are some indications that the past high-tech development policy of China was effective in some ways. However, these efforts did not foster creativity. According to the National Statistics Bureau, the total sales of high tech industries in China increased by 7.7% in 2001 compared with 1996, but the value-added rate decreased 0.7% during the same period. Close to 90 percent of hi-tech exports come from export processing activities based on imported materials, and this rate has been rising (see Figure 1). The lack of domestically developed

technologies and products of nationally-owned intellectual property rights in high-tech industries limits the profit-making capabilities of domestic enterprises. The growing gap in the capabilities between advanced countries and China defies easy solutions. Promoting creative entrepreneurship and creating an innovative milieu should evolve into key development programs.

III. Targeting innovative cities: comparison between Beijing and Shanghai

Overview

Beijing and Shanghai are two of China's leading cities. Each plays a different role in the national economy and these roles are continuing to evolve.

Table 1: Major indicator of Beijing and Shanghai, 2002

	Area ($1,000km^2$)	Population* (1,000)	GDP (RMB billion)	GDP/Capita (RMB)
Beijing	17	14,230	321.3	28,449
Shanghai	6	16,250	540.9	40,627

Note: * only registered residential population, floating population not included
Source: Beijing Statistic Yearbook 2003; Shanghai Statistic Yearbook 2003.

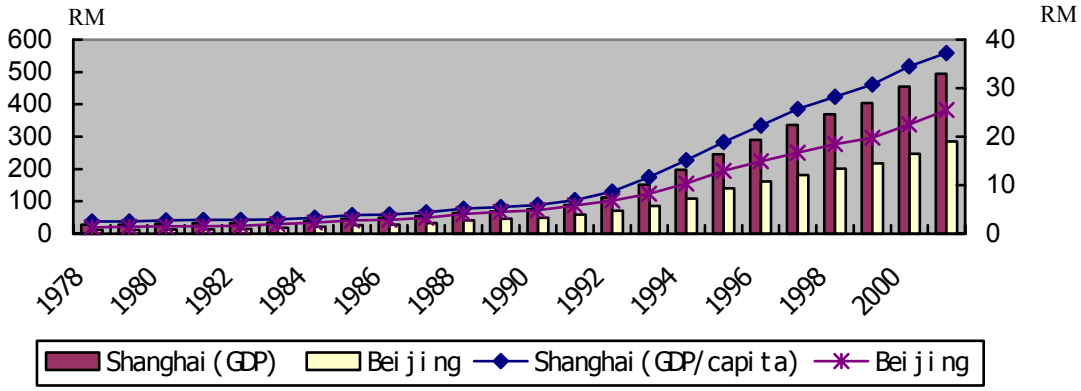
Changing roles in the national economy

Since the establishment of the socialist economy, Beijing has developed into an industrialized city with a fully integrated industrial structure covering the fields of electronics, iron and steel, machinery, chemicals, textiles, automobile manufacturing, etc. But Beijing is constrained from developing large industrial complexes by the lack of water resources. This bottleneck limits Beijing's industrialization. Still, Beijing has an irreplaceable position in the national economy and is often the first choice for foreign companies wanting to locate in China. These advantages are quite crucial in developing knowledge intensive business services.

Shanghai is ideally located to serve as the gateway to the Yangtze Valley area from the sea. But before the first Opium War between China and the Britain in 1840s, it was little more than a small town supported by fishing and weaving. Since then, following the unfair treaties sighed after a series of wars, foreigners came into Shanghai to establish settlements and businesses. The British, along with the Americans and French, were allowed to live in certain territorial zones without being under Chinese laws. As a result, Shanghai became greatly influenced by Western culture. It became an international port and the financial and commercial

center in the 1930s and nurtured one of the most important industrial bases in China before the Sino-Japanese War broke in 1937. The wars lasting many years blocked the path of growth. After 1949, the Communist Chinese Government began to transform Shanghai into a solid industrial base for the national economy. Starting in the early 1980s, the open door policy allowed. Shanghai to start regaining its position as finance and commerce center with the return of foreign banks in the new Pudong Financial District and the establishment of a modern stock exchange market.

Figure 2: The GDP and GDP per Capita of Beijing and Shanghai, 1978-2001



Source: Shanghai Statistics Yearbook 2002; Beijing Statistics Yearbook 2002.

Urban centers of emerging metropolitan regions

Since China's reforms commenced in the late 1970s, three metropolitan regions have demonstrated the greatest dynamism and the highest growth rates[3], two centered in Beijing and Shanghai respectively: Beijing is the economic heart of the Rim of North China Sea (*Huan bohai*), while Shanghai lies at the center of the Yangtze River Delta. Regional development has buttressed urban growth and pushed economic restructuring in both these cities.

Table 2 shows the changing economic structure in Beijing and Shanghai from 1978 to 2001. Beijing and Shanghai are facing common challenges to sustain their growth in the

[3] According to this report, the three metropolitan regions in coastal China are the Rim of North China Sea (Huan bohai) centered on Beijing, the Yangtze River Delta centered on Shanghai, and the Pearl River Delta axis on Guangzhou-shenzhen, (or, actually, centered on Hong Kong), together up to 0.3 million km2 (less than 3% of the national in total), producing 37% of the national GDP in 2002. And it is estimated that this number is to reach 65% in 2020.

transition toward an open and market oriented economy. They are having to cope with the general decline of state-owned sectors (see Table 3) and, in some cases, the shifting of manufacturing enterprises to suburbs. The two cities also confront a fast increasing urban population without sufficient infrastructure to host such growth.

Economic structures have changed dramatically in Beijing and Shanghai, with the proportion of the service sector in the total economy growing rapidly in the 1990s. However, due to the policy bias in the past, the development of service sectors, especially advanced value-adding business services, still lags behind overall urban growth. In order to compete with cities in the hinterland, Beijing and Shanghai are having to upgrade their industries and seek to become regional hubs in the global economy. Both the administrations of Beijing and Shanghai are aware of the urgent need for innovation capability to sustain urban growth and retain competitive advantages.

Table 2: The industrial structures of Beijing and Shanghai in selected years, 1978-2001

%	1978	1990	1995	2000	2001
Beijing					
Employees					
Primary sector	28.3	14.5	10.6	11.8	11.3
Secondary sector	40.1	44.9	40.7	33.6	34.3
Tertiary sector	31.6	40.6	48.6	54.6	54.3
GDP					
Primary sector	5.2	8.7	5.8	3.6	3.3
Secondary sector	71.1	52.4	44	38.1	36.2
Tertiary sector	23.7	38.9	50.2	58.3	60.5
Shanghai					
Employees					
Primary sector	34.4	11.1	9.8	10.8	11.6
Secondary sector	44.0	59.3	54.5	44.3	41.2
Tertiary sector	21.6	29.6	35.7	44.9	47.2
GDP					
Primary sector	4.0	4.3	2.5	1.8	1.7
Secondary sector	77.4	63.8	57.3	47.6	47.6
Tertiary sector	18.6	31.9	40.2	50.6	50.7

Source: Beijing Statistic Yearbook 2002; Shanghai Statistic Yearbook 2002.

Table 3:The employees in state-owned sectors in Beijing and Shanghai in selected years

% of employees	1978	1990	1995	2000	2001
Beijing	54.2	57.1	53.8	45.7	40.4
Shanghai	86.2	71.9	59.7	55.7	54.4

Source: Beijing Statistic Yearbook 2002; Shanghai Statistic Yearbook 2002.

Comparison in ranking games

Shanghai and Beijing are the two top ranked cities or regions with respect to economic development. Shanghai leads Beijing according to several indicators of performance, such as GDP, GDP per capita, industrial outputs, import-export, FDI, etc.

It also leads in other respects as well. Table 4 and Table 5 show two different indicator systems compiled by various institutes, all based on the same official published statistics.

Table 4: Ranks of Beijing and Shanghai in *City Development Report of China 2002*

	Population/ Labor force	Economic performance	Social welfare	Infrastructure	General
Beijing	2	2	2	1	2
Shanghai	1	1	1	3	1

This report was produced by the State Statistic Bureau. Each subsystem in the table was further divided into a series of indexes that can be found in statistic yearbook to calculate the rates of each city.
Source: based on *City Development Report of China 2002*

Table 5: Ranks of Beijing and Shanghai in China Urban Development Report 2001-2002

Ranks in subentry	Shanghai	Beijing		Shanghai	Beijing
Fundamental Strength	1	3	*Social welfare*	1	3
Resources	1	4	Social justice	1	2
Size of economy	1	4	Social security	1	2
Industrialization level	1	2	Social advancement	1	3
Infrastructure	1	2	*Urban Management*	2	5
Competitive capacity	1	2	Efficiency	3	13
Innovative capacity	1	2	Place promotion	1	6
Learning capacity	2	1	Regional spillover	9	5
Resource productivity	1	2	*Sustainable development*	9	6
Informationalization	1	2	Ecology	47	6
Global linkages	1	2	Environmental quality	29	17
			Harmony	4	7
			Influence	3	13

General ranks	Shanghai	Beijing
Growth potential	2	3
General capacity	1	2
Real capacity*	1	2

Note: * composition of up two
Source: based on *China Urban Development Report 2001-2002*[4].

[4] This research was sponsored by the China Mayor Association, also based on indexes in statistic yearbooks, but with more detailed subentries. The indicate of the general capacity of a city is described from 5 perspectives, i.e. fundamental strength, competitive capacity, social welfare, urban management, and sustainable development, while each perspective is a combination of a set of indexes, for example, the "fundamental strength" was measured by a function with 4 variables, i.e. resources, size of economy, industrialization level, and infrastructure, which can be further calculated with the data in official statistic yearbooks.

However, the picture differs with respect to innovative capacity, as the *Annual Report of Regional Innovation Capability of China* (2001 and 2002) shows. Beijing lagged behind Shanghai in 2001, but generally surpassed Shanghai one year later (see Table 6). According to this report, Beijing has enhanced the innovation capability of enterprises as measured by the outputs of new products and technical innovations. This may be the result of success in attracting enterprises and research institutes of both domestic and multinational corporations to Beijing. Shanghai remained stable in most subentries.

Table 6: Ranks of Beijing and Shanghai in *Annual Report of Regional Innovation Capability of China*[5]

	Knowledge creation	Knowledge diffusion	Innovation capability of enterprises	Innovation environment	Economic performance of innovation	General
			2001			
Beijing	1	4	4	1	2	2
Shanghai	2	1	2	2	1	1
			2002			
Beijing	1	6	2	1	1	1
Shanghai	2	2	1	2	2	2

Source: based on Annual Report of Regional Innovation Capability of China 2001 and 2002.

Table 7: Selected responses to on-line survey comparing investment environment in Beijing and Shanghai[6]

Which city is better? (% of responses)	Beijing	Shanghai	No opinion
General condition			
Social economic performance	14	65	21
Openness and global linkages	6	80	14
Business environment			
Regional economy	7	88	5
Financial services	12	74	14
R&D human resources	51	23	25
Innovation capability of enterprises	16	63	21
Education	51	17	32
Government services			
Transparency	18	51	31
Government efficiency	10	66	24
Place promotion	11	64	25
Living condition			
Culture amenity	18	59	23
Foreigner's living convenience	19	53	29
Environmental quality	13	69	18

[5] Annual Report of Regional Innovation Capability of China is written by the academic research group on China's science and technology development strategy. The members of the group are coming from National Science and Technology Bureau, Chinese Academy of Sciences, The State Counsel, Chinese Academy of Social Sciences, Tsinghua University, National Planning Commission, Beijing Institute of System Engineering, etc. This seriate report has been published since 2001.

[6] This on-line survey was jointly conducted by China Economic Times, MNC Research Center of Nankai University, and China Foreign Investment Network in 2003, in which 36 questions covered four issues: regional economic environment, business environment at firm's level, government services, and living condition. To the date of this report was compiled, there are 828 responses came from users of China Foreign Investment Network, more details about the survey can be obtained from: http://www.chinafiw.com/e_m/site/mysystem8936.asp

Table 7 shows the findings from another interesting survey targeting executives in foreign companies which compares the investment environment in Beijing and Shanghai. This also favors Shanghai over Beijing with regard to the general business environment and living conditions.

Generally speaking, Shanghai leads Beijing both in overall economic strength measured by various indicators and in terms of living convenience. Our survey results support this conclusion. Shanghai is more attractive to talented people than Beijing. The municipal government invests heavily in the construction and modernization of urban infrastructure. Average payments for employees and stock buyers per million people are higher in Shanghai than in Beijing. The climate of Shanghai is milder compared to that of Beijing. However, although our interviewees in Beijing complained about the deterioration of air quality in the city, the traffic jams, and the bureaucratism of the government officials, they were appreciative of the cultural amenities available in Beijing, which tends to be more tolerant of diversity.

IV. Emerging urban innovative industries

We define "innovative industry" to cover three kinds of knowledge-intensive enterprises, the high-tech manufacturers, the knowledge intensive business services, and the creative content providers, which are identified as the key business sectors deemed to have high innovative propensities. These were the subsectors from which we selected the firms for our survey. But this definition is not the standard industrial classification in official statistical yearbooks in China. In order to provide a picture of the development of these industries in Beijing and Shanghai, we, therefore, use alternative indicators, which might be subject to some overlap with each other, to show the number of firms and employees in these sectors in Beijing and Shanghai, as well as their proportions to the national total.

General comparison

High tech industry

China has been promoting high-tech industry as part of its national science and technology development policy for over 10 years, and established an authorization system to name high and new tech enterprises (*Gaoxinjishu Qiye*) operating in the high-tech industrial parks in many cities. The authorized "high- and new-tech enterprises" in this system can enjoy preferential treatment. This category of high-tech industry covers various sectors, including

electronics and IT, life science/pharmaceutics, environmental protection technique and equipment, new materials, photo-electronics and laser-mechanic-electronics, and technology for aerospace and earth space. A large portion of these companies are manufacturing firms, while many software companies, R&D and technical service companies are also covered in this category.

Table 8 shows the indicators of high- and new-tech enterprises in the industrial parks in Beijing and Shanghai in 2001. Beijing outpaces Shanghai in the number of high-tech firms and employees, their revenues, as well as their exports; however, Shanghai leads Beijing in the average size of firms, and with regard to the revenue and exports either per firm or per employee.

Table 8: Indicators of high-tech and new tech enterprises in industrial parks of Beijing and Shanghai, 2001

	Beijing	Shanghai	National in total
Number of firms	7911	405	24293
Number of employees	282720	73652	2761433
Revenue (billion Yuan)	125.6	83.8	1011.7
Export (million US$)	2928.9	2512.6	22664.4

Source: China Statistic Yearbook 2002.

Knowledge intensive business services and creative content providers

As to knowledge intensive business services and creative content providers, there is even more vagueness in the classification. We select several categories as well as subcategories relevant to our firm survey from the published statistical materials (see Table 9). We find that Beijing surpasses Shanghai in the number of firms and employees in almost all the categories and subcategories.

Table 9: Knowledge intensive business services and creative content providers in Beijing and Shanghai, 2001

	Beijing		Shanghai		National in total	
	Firms	Employees (thousand)	Firms	Employees (thousand)	Firms	Employees (thousand)
Total	222766	6466.9	235347	8267.8	3025862	165022.2
Computer services	6981	153.5	3384	65.2	29256	522.5
Software development	4679	100.9	2353	47.5	20027	371.1
Computer system services	1230	24.8	574	7.7	4771	69.1
Information Consultancy	26682	304.8	7576	109.5	77787	934.2
Advertisement/marketing	5215	61.4	1983	28.5	27953	294.9
Business Consultant	8298	93.1	459	11.2	16350	234.1
Finance/security	1618	137.3	958	114.7	63271	3835.0
Culture and Arts	1991	40.2	693	15.8	5544	150.5
Printing Publishing	364	21.2	174	6.2	1629	90.8
Media	348	10.4	267	7.3	5159	148.0

Source: The Second National Survey on Basic Units, 2002.

Together, Beijing and Shanghai hold a large share of innovative industries in the country according to the figures in Table 9, whether in terms of firm numbers or employee numbers. However, the innovative sectors are still small in the overall urban economy in Beijing and Shanghai. For example, employment in the high- and new-tech enterprises amounts to about 4% of the total employment in Beijing and less than 1% in Shanghai.[7] The disparities between Beijing and Shanghai in knowledge intensive business services and creative content providers seem even larger. The employment in the selected categories together adds up to nearly 10% of the total employment in Beijing, much higher than that of the nation as a whole (3.3%), while this figure is less than 4% for Shanghai, only a little higher than the national level.

Innovative industries in Beijing

Beijing has unique advantages as the national capital in the development of innovative industries.

National R&D center for high-tech development

Beijing has an abundance of academic think-tanks, universities, research institutes and research and development (R&D) centers. More than 50 universities and colleges and over 200 research bodies are located in the capital, helping to spawn the largest number of high-tech enterprises in China, and some of the nation's top high-tech companies such as Lenovo and Founder. Table 10 compares the R&D investment in Beijing and Shanghai in 2000. The large number of state-owned higher education and R&D institutes received the lion's share of government funded R&D investment.

Table 10: The R&D Investment in Beijing and Shanghai, 2000 (Unit: b￥)

	Beijing	Shanghai	National in total
Total R&D investment	21.4	5.3	62.5
Government funds	13.6	3.1	39.9
Enterprises investment	1.7	0.6	5.8
Foreign investment	0.68	0.01	0.74

Source: National R&D Resources Survey 2000.

[7] However, according to a more extensive definition of high-tech industries which not limited within high-tech industrial parks, the gross output value of high-tech industries in both Beijing and Shanghai has hold a large share in total industrial output, over 20%, in both cities in 2002 (See Beijing and Shanghai Statistic Yearbook 2003).

The concentration of universities and research institutes provides not only R&D capacity, but also the largest pool of knowledge human resources in China. The concentration of R&D resources in Beijing not only stimulated the entry of local high tech firms, but also attracted many multinational corporations (MNCs) to invest in offshore R&D facilities. According to the latest figures from the Beijing Municipal Foreign Economic and Trade Commission, 15 multinationals, including Microsoft, IBM, Siemens, Motorola, Nokia, Samsung and Dell, have established either their China headquarters or regional research centers in Beijing. Microsoft built its first research institute in Asia in Zhongguancun area in 1998 to access the high quality software talents in this region. Intel established its Asian research institute in Zhongguancun area recently in 2004.

Influential position in domestic market on innovative products and services

Another attractive feature of Beijing, especially for foreign investment, is its capacity to influence the domestic market. For example, an executive of EDF, a French company providing large scale electricity engineering solutions, said that when the company did business in China, it had to maintain intensive communication with the higher decision-makers in the central government or other state-owned sectors. So Beijing was the first choice for the company when it decided to locate in China although this foreign employee personally prefers Shanghai for its living conveniences and cultural amenities.

Beijing's unique position in the domestic market is critical to the development of innovative industries. Zhou and Tong (2003) find in their research on ICT service clusters, in the Zhongguancun area of Beijing, that local firms served as intermediaries between MNCs and the local high-tech market. The huge investment in the national informatization projects has given rise to the strong market demand for ICT products and services. The MNCs have technological advantages, and tend to rely on local firms to exploit the domestic market. Thus, the hierarchical and interdependent relations between MNCs and local firms plays an essential role in the evolution of local technological capacity. While in collaboration with MNCs, the local firms learned the critical technologies and management skills to serve the demands of domestic customers, and acquired valuable market experience.

Cultural center for creative content industries

Creative content providers also concentrate in Beijing, but do not cluster in specific locations as the IT firms in Zhongguancun area. Beijing is the cultural center of the country, with the most national universities and research institutes, as well as the largest population with higher education in China, which provides both the content producers and the demanding buyers for cultural goods and services. However, there is still another reason responsible for this spatial concentration of content industry, that is, the monopoly control in this sector by the central government, especially of print publishing and public media.

The co-location of the IT industrial cluster and the content sector in Beijing provided a good environment for the rapidly expanding Internet economy in the late 1990s and the beginning of the new millennium. The potential growth of a new interactive media in the country with the largest population in the world gave both technologists and venture capitalists promising opportunities. The population of Internet users in China keeps increasing quickly, reaching 84 million in 2004, 10% of which are residents in Beijing (about 4 million) and Shanghai (about 4.3 million). And Beijing still has the largest number of Internet domains in China, 84,144, about 24.9% of the national in total, leading second-ranked Shanghai (8.5%) by nearly three times (CNNIC, 2004).

Innovative industries in Shanghai

Shanghai, as well as its surrounding region in the Yangtze River Delta, has a solid industrial base and innovation capability, particularly related to manufacturing. Table 11 compared the R&D activities in manufacturing in Beijing and Shanghai, showing the advantage of the latter.

Table 11: The R&D activities in manufacturing in Beijing and Shanghai, 2000

	Beijing	Shanghai	National in total
R&D personnel	5794	7117	240609
R&D investment (billion Yuan)	1.1	1.06	20.0
Patents	1120	2053	25257

Source: National R&D Resources Survey 2000.

Regional technology center

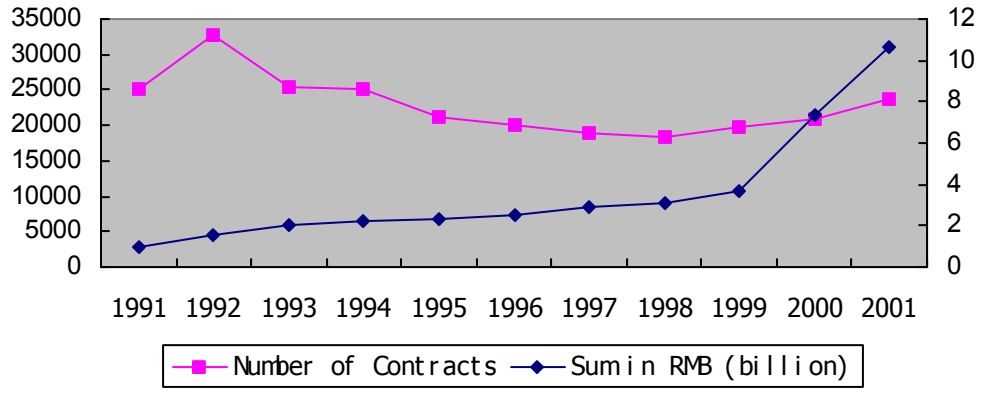
While it lags behind Beijing in knowledge creation and the generation of startup companies in the innovative sectors, Shanghai has a lead in the commercialization of technological innovations. Table 12 compares the patents and technology contracts occurred in Beijing and Shanghai in 2001. The sum of technology contracts in Shanghai is almost double that in Beijing, and is increasing fast in recent years (see Figure 3). The development of manufacturing in the Yangtze River Delta, mainly in the private sector, is raising the market demand for advanced technology services in this region.

Table 12: The Patents, technology contracts in Beijing and Shanghai, 2001

	Patents		Technology contracts	
	Applications	Authorized	Number of contracts	Amount of money (billion Yuan)
Beijing	12159	6244	23921	10.6
Shanghai	12777	5371	23816	19.1
National in total	165773	99278	-	78.2

Source: Beijing Statistic Yearbook 2002, Shanghai and Statistic Yearbook 2002.

Figure 3: The Technology Transactions in Shanghai, 1991-2001



In fact, Shanghai played a critical role in transferring technology at the beginning of rural industrialization in the early 1980s. Engineers and technicians from large and medium sized state-owned enterprises in Shanghai often went to the township enterprises in rural areas nearby to train workers and provide technical advice. Such technical services were often informal in nature. However, as private enterprises multiplied, more and more companies began to establish

formal relations with technical service providers, either internalizing the R&D function into the organization of the company, or outsourcing technical services using formal technology contracts.

Booming of IC industry

Just as Beijing boosted its IT sectors by marketing value adding services to the end customers by leveraging its unique position in the domestic market, Shanghai is strengthening its advantages in integrated circuit (IC) production, and the more technology/capital-intensive activities in the value chains of IT manufacturing to serve the emerging regional clusters of IT industry in the Yangtze River Delta. Thanks to Shanghai, the Delta has become the second most important IT manufacturing base on Mainland China. Many IC producers, mainly coming from Taiwan, have decided to locate their new plants in Shanghai or its neighboring area, such as Suzhou, serving the growing Chinese market. The establishment of IC manufacturing plants has also attracted clusters of IC design companies moving into Shanghai, particularly concentrating in the Zhangjiang High-tech Park in Pudong area and the complex of Kejijingcheng.

Finance and Trade center

Knowledge intensive business services are also expanding in Shanghai, which is capitalizing on its past heritage as the international finance and trade center in the Far East. The grand mansions of foreign banks in the Bund (*Waitan*) established in the early part of the last century are reminders of this heritage. In 1990, the Central Government developed Pudong, the eastern part of Shanghai, and in the same year, Shanghai opened the first stock market in socialist China, Lujiazui Finance & Trade Zone. China's only national-level development zone named after “finance and trade”, was established on the west end of Pudong, right opposite to the old Bund across the Huangpu River, and it has become a symbol of Shanghai’s ambition to regain its position in the international financial market. However, the monopoly control by the central government of the banking system presents a hurdle. The weakness of the banking system has become a bottleneck to China’s industrial development. This may change with China’s entry to the WTO but it still remains to be seen.

Attractive cultural capital

For a century before 1949, Shanghai had been China's most open metropolis, and the cultural playground. From 1949 until 1978 the artistic and intellectual center shifted north to Beijing. Now the city is regaining its status of the cultural hothouse, the most creative city in China.

The entertainment industry in Shanghai is flourishing alongside the rise in cultural consumption and personal wealth. The population of Shanghai has enjoyed high disposable income since the early 1990s, increasing over 400% from US$360 per capita in 1992, to US$1,570 in 2001. Shanghai underscores its importance in China's total volume of cultural and entertainment consumption. There are thousands of entertainment venues in Shanghai, such as dance halls, video game parlors, cyber cafes, video screening houses and cinemas.

Shanghai is moving quickly toward the goal of creating a modern center of international culture in Asia. Determined to raise the city to the level of regional rivals like Tokyo and Hong Kong as well as Beijing, Shanghai officials have made culture a major priority. As a cornerstone of the revival, which began in earnest in the early 1990s, the Shanghai government spent $226.8 million, an immense sum in a country still classified as a developing nation, to build a world-class cultural complex in the city center (French, 2004).

The number of exhibitions, live performances, and music concerts is growing every year, and broadcast music and entertainment through radio, film and TV is more popular than ever before. In 2001, Shanghai had 90 theatres, 1,450 night-clubs, 5,150 large restaurants, 80 conference venues and 90 professional film / TV studios. The notable structures include the Shanghai Grand Theater, the equally striking Shanghai Museum, in the shape of an ancient Tang vessel, and the Shanghai Art Museum.

In addition, the influential Annual Exposition of International Galleries and Artists Featuring Modern and Contemporary Art are held in Shanghai, sponsored by the Shanghai Oil Painting & Sculpture Institute.

International events such as the World Expo in 2010 are expected to further stimulate growth and development in China’s culture capital. However, to become a world-class cultural center, Shanghai should stress further its cultural diversity.

V. Urban policy targeting innovative city: a critical review

Since policy makers are increasingly aware of the importance of innovation in economic development and urban growth, both Beijing and Shanghai have targeted creativity and innovative capacity of the city in their urban policies. Browsing through government documents, we can often find similar slogans and promises, such as "promoting knowledge-based economy", "building an information society", "constructing international city", "establishing regional innovation system", "encouraging investment on R&D"… and, to some extent, competing with each other. The policy tools are also similar, such as planning industrial parks for particular kinds of innovative industries (high-tech, software, life sciences, etc.), subsidies for R&D investment of enterprises, preferential treatment for inducing foreign investment or overseas Chinese talent, and so on. However, the policy effects vary greatly, not only from city to city, but also from sector to sector.

The role of the state in supporting innovative industries

The municipal authorities of Beijing and Shanghai have each sought to promote a range of industrial activities as key industries for urban growth. Various terms with overlapping definitions have been used to serve different policy targets, such as high-tech industry, IT industry, urban industry, advanced manufacturing, etc. It's interesting to see the role the state played in different ways at the local level.

Segal and Thun (2001) tackled this issue by addressing the question as to why Beijing is more successful in the development of the IT industry while Shanghai did better in promoting the car industry. They attribute the disparity of policy effects to the differences in the local governance structure. Contrary to the common belief that the government is more influential in Beijing than in Shanghai, Segal and Thun suggest that from the perspective of local government, it is Shanghai that has a stronger local developmental state, with a unified municipal bureaucracy and a local economy dominated by large conglomerates, inherited from the period of central planning.

Faced with the challenge of developing a new industrial sector, officials in Shanghai relied on their capability to build large business groups (*jituan gongsi*). Large amounts of capital were funneled to state-owned enterprises, and the city government actively participated in the establishment of producer and supplier networks. "This approach to industrial development

worked (in car manufacturing) because the key task was to coordinate the activities of a relatively limited number of enterprises, and successfully implant into Shanghai a set of known technologies…" However, "the IT sector required a much less direct approach, greater flexibility, and a willingness to accept that public agencies could not keep pace with rapid changes in technology."

Beijing, on the other hand, had a more fragmented local bureaucracy, and smaller firms dominated the economy. Pulled between the needs of the city and the national economy, local bureaucrats were unable to work closely with the managers of large state-owned enterprises or to build new business groups. Instead, they promoted a more diffuse form of development that linked smaller firms through personal networks rather than governmental structures.

The case of Zhangjiang High-Tech Park also shows the limits of the developmental state in the global knowledge-based economy. The Shanghai Zhangjiang High-Tech Park, a national-level park designated for the development of high- and new-technology established in Pudong in 1992, was initially planned to focus on bio-tech and pharmaceutics, to avoid competing with Beijing in its established position in the national IT industry. The government invested heavily to establish the State Bio-Tech and Pharmaceutical Base (Shanghai) and to induce foreign investment relevant to this field. However, the complicated patent system for biotech and pharmaceuticals in developed countries has become a barrier for firms in regions without supporting venture capital and subsidiary peer firms to play the game. Still, the fast development of IC production in Zhangjiang was initially beyond the expectations of the administration. Now Shanghai has launched a strong financial incentive package for this industry to realize the ambition of becoming a leading IT production center in the Asia-Pacific region.

Re-imaging of the city and urban renewal

The direct support for selected key industries by government has proved risky and, in many cases, inefficient in an increasingly open and dynamic world. It could be a better strategy for the local government of a city to attract new developers or innovators rather than involve itself directly with the development of a new industry. By creating a fresh image, a city can overcome a negative image from the past and enhance its competitive advantage.

Both Beijing and Shanghai have tried to re-image themselves using a wide range of place promotion activities to target overseas investors, particularly the global top 500 multinational

corporations (MNCs). And the Internet helps to send materials to a global audience (Wu, 2000). In the beginning of the new millennium, Beijing and Shanghai each found an opportunity to create new image: Beijing will hold the 2008 Olympic Games, while Shanghai will be the site of the World Expo 2010.

In support of the efforts on new image promotion, investment has been funneled into urban renewal. Beijing and Shanghai are competing with each other in attracting the MNCs to establish regional headquarters. A new term "headquarter economy" (*Zongbu Jingji*) was invented to describe this phenomenon, which typically refers to the most luxury and modern district with numerous skyscrapers, modeled on Manhattan in New York.

For example, the municipal authority of Beijing launched an urban renewal project in the heart area of Zhongguancun in 1999. Just along the former "Electronics street", over 15 billion *Yuan* was invested in an area of about 0.5 km^2 boosting the high-tech CBD of the new Zhongguancun High-tech Park[8]. The urban renewal project will totally change the landscape in the core of Zhongguancun. However, firms in Zhongguancun have responded variously. Most of small and medium technical firms complained that the project pushed by the government raised the housing price around this area and firms are finding that they cannot afford the soaring business costs. According to a human resource survey in Zhongguancun, sponsored by the real estate developers, over 70% of the respondents said they were thinking of relocating to a cheaper area. If the local SMEs cannot afford the increasing business cost in this area, the real estate developers involved with the renewal project have to rely on inducing MNCs to come to the area.

Taking the international city as the object of urban development, Shanghai has also invested heavily in urban renewal, but to some extent, in a different way. As most of manufacturing has been shifted to industrial parks in suburbs, abandoned plants and lofts in the inner city were left empty. The city had the choice of pulling down these old buildings to build new ones or transforming them into new space for new industries. Shanghai chose the latter course, renewing these old buildings by developing "urban industries (*Dushi gongye*)". At present, nine former factories in the inner city and several old depots along the Suzhou River, have been refurbished to host the new urban industries, including software development,

[8] The new Zhongguancun Science and Technology Park has been much larger than the original Zhongguancun in geographical sense to cover 5 industrial parks with different location in the city or suburb, see Zhou and Tong, 2003.

commercial advertisement, fashion design, jewelry design and processing, domestic decoration design, and other industrial design services, most of which are falling into the definition of urban innovative industries. Four creative clusters of Shanghai are appearing in the districts of Luwan, Huangpu, Changning and Jing'an. For example, the creative design activities are concentrated in Taikang street (*Taikanglu*) animated cartoon drawing and making activities are clustered in Changping street *(Changpinglu*). The refurbished plants provide working space to these companies at much lower costs than the offices in the new buildings nearby. And the companies keep some old elements in the decoration to reflect the history of the building. Such buildings and revitalization of the urban realm have become a new attraction for tourists.

Beijing has also targeted previously deserted or run down areas for new uses in the form of work, exhibition and performance space geared to local, emergent cultural producers. One case at this point is in the so-called *Jiuxiaoqiao*-loft in the north-eastern Beijing. The artists are clustered in the old buildings of the 798 electronic factory which was built in the 1950s by the experts from the Soviet Union. Another case is the famous collection market of antiques—the Panjiayuan Folk Culture market. It is also located in the old industrial area of eastern Beijing.

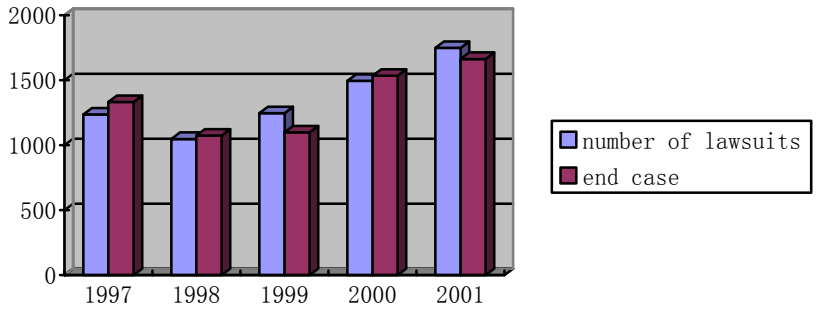
Improving intellectual property protection

The intellectual property system is central to the knowledge-based economy, for it enables the innovators to earn suitable rewards from their innovation. This issue can hardly be limited to any particular city, for it's a part of the national legislation. China has promulgated its earliest laws on intellectual property in 1898, during the Wuxu Political Reform in the end of Qing Dynasty, modeling from the industrialized countries then, and covering most of the modern intellectual property rights. However, these laws were not put into practice, for the country fell into chaos in the following century. The present national intellectual property law system was established step by step since the early 1980s, including the Trademark Law (1982), the Patent Law (1984), the Copy Right Law (1990), the Ordinance on Software Protection (1991), and the Anti-unfair Competition Law (1993). Along with the constitution of domestic intellectual property laws, China has also signed most of the international conventions on intellectual property protection.

From the perspective of the written laws in China, the national intellectual property law system is relatively well developed, however, in practice the protection of intellectual property in

China is not satisfying at all. The most serious problem is the enforcement of laws. Because the original pressure to constitute domestic intellectual property laws came mainly from the demand to make the domestic law system consistent with the international conventions for trade, the domestic intellectual property law system was mainly modeled on overseas practices. It is natural that the enforcement of these laws met with challenges under the economic and social context of China. The contents of the laws have been emended several times in less than 10 years. And it took the government a lot of time and energy to educate the domestic producers and consumers to understand the importance of protecting intellectual property rights. The public is increasingly aware of its IP rights in business. We can see a rising trend of lawsuits on intellectual property conflicts in China in the last several years (see Figure 4), although lawsuits are time consuming and costly, and, in most cases, the compensation decided by the judge cannot recover even a small fraction of the real loss incurred by the victim.

Figure 4: The Number of Lawsuits and End Cases on Intellectual Property Conflict1s in China, 1997-2001



Individuals can receive assistance from the relevant authority in the local government in most IP conflicts, which could be more efficient than through the legal system. Many legal service agencies also provide professional consultants on this issue. However, according to our survey in Beijing and Shanghai, most firms, especially SMEs, don't believe that they can really get protection when involved in IP conflicts. Firms in high-tech manufacturing and knowledge intensive business services can protect themselves by adding IP items in contracts with customers. But media and content producers are at the mercy of pirates.

A gap exists between the protection that the IP law system can really provide and the expectation of individuals. In this sense, the foreign companies have better capability to utilize

the IP law to protect their interests in businesses, and actively cooperate with the government in anti-infringement actions.

Generally speaking the IP protection in Beijing and Shanghai is much better than the national average level. Firms from home and abroad are learning how to do businesses with IP rights involved. As to incorporating the awareness of IP rights into the local business ethnic morality, there is still a long way to go.

VI. Survey Findings

Survey Instrument and Profile of Survey Respondents

To gain the viewpoints of the enterprises belonging to the creative industries subsector in Beijing and Shanghai on the urban environment for nurturing creativity and innovative capacity, we conducted a small exploratory survey covering 100 firms (50 in Beijing and 50 in Shanghai) during Aug. 2003 – Apr. 2004 using a semi-structured questionnaire designed by the World Bank. It contained a total of 63 questions, many of which were open ended in order to obtain a richer range of responses on various issues. Issues covered were as follows:

a) Determinants of location choice
b) Knowledge workers supply
c) Availability and quality of business services
d) Cluster economies
e) Intellectual property law
f) Views on cities in the knowledge economy

The questionnaire was completed through a combination of self-administration by respondents and face-to-face interviews. Each interview took around 45 to 90 minutes to complete. According to the description provided by the respondents, we grouped the firms interviewed into three categories:

- **High-tech Manufacturing**, including electronics/IT manufacturing and life sciences firms;
- **Knowledge Intensive Business Services** (KIBS), including consultancy, legal, marketing, financial, IT services, etc.;

- **Creative Content Industries**, including print publishing, Internet content providers, software, multimedia, TV, Movie, game, etc.

The sectoral composition of respondents is shown in Table 13. Of the 50 firms in Beijing, 15 are in high-tech manufacturing, 20 are in knowledge intensive business services (KIBS) and 15 are in creative content industries. The figures for Shanghai are 21, 9, and 20, respectively. While the sample size is too small to achieve any realistic proportionate sampling, an attempt was consciously made to cover the spectrum of relevant sectors, size and ownership, reflecting the characteristics of innovative industries in each city.

Table 13: Composition of Survey Samples

Sector	Beijing		Shanghai	
	Number of firms	%	Number of firms	%
High-tech Manufacturing	15	30	21	42
Electronics/IT manufacturing	10	20	15	30
Life Sciences	5	10	6	12
Knowledge Intensive Business Services	20	40	9	18
Consultancy services	2	4	6	12
IT services	8	16	-	-
Marketing services	5	10	1	2
Financial services	1	2	1	2
Other services	4	8	1	2
Content sectors	15	30	20	40
Print publishing	3	6	2	4
Software/games/multimedia	9	18	17	34
Other (TV, film…)	3	6	1	2
Total	50	100	50	100

In Table 14 the ownership and locational characteristics of the sampled firms are summarized. The large majority of the surveyed firms are non-state-owned enterprises. This is fairly representative of the emerging innovative sectors in China. In Beijing, each category has over 1/3 of the sampled firms with government investment, and less than 1/5 with foreign investment. In Shanghai, the large majority of the surveyed firms have received some foreign investment, particularly all the KIBS sample companies are foreign controlled. This reflects the differences between Beijing and Shanghai.

As to locational characteristics, more than half of the sample companies in both Beijing and Shanghai have facilities (plants, branches, and subsidiaries) elsewhere, mainly within China. And a larger proportion of the sampled firms in Beijing headquartered locally than in Shanghai. Particularly, the sampled firms in high-tech manufacturing in Shanghai are highly

internationalized, either measured by the ownership structure, locational characteristics, or by export propensity.

Table 14: Characteristics of Survey Companies

	High-tech	KIBS	Media/Content	Overall
Beijing				
Ownership				
Gov. have a financial stake	33	40	33	36
Foreign company have a financial stake	6.7	25	-	12
Foreign controlled	13	20	6.7	14
Location				
Firm has facilities elsewhere	67	70	53	64
Headquarters is outside Beijing*	13	10	13	12
Export Propensity				
Firms exporting	33	35	20	30
Shanghai				
Ownership				
Gov. have a financial stake	29	-	30	24
Foreign company have a financial stake	10	-	5	6
Foreign controlled	62	100	65	70
Location				
Firm has facilities elsewhere	71	67	75	72
Headquarters is outside Shanghai*	50	-	25	12
Export Propensity				
Firms exporting	62	11	70	56

Note: *As to foreign controlled companies, the headquarter refers to regional headquarter in China

The size of firms surveyed is shown in Table 15. Most of the interviewees refused to provide information on their sales revenue, while 46 interviewees in Beijing and 44 in Shanghai answered the question by giving the number of employees in the company. The percentage reflects the proportion to the respondents. Overall, the sample includes representative shares of large, medium and small firms in all three sectors. The majority of the firms surveyed are in the small-medium category, in terms of number of employees. The sample of large firms is greater in Shanghai than in Beijing, which is representative of the situation in the two cities.

The sampled firms both in Beijing and Shanghai are on the whole quite young, about half having been established less than 5 years ago, while few firms have been in existence for more than 20 years (Table 16). This is more marked in the case of the respondent firms in the knowledge intensive business services, in line with the fact that the service sector started to grow in importance in the urban economy only in recent years.

Table 15: Number of Full-time employees (% of respondents)

	High-tech	KIBS	Media/Content	Overall
Beijing				
Less than 10	13	18	-	11
Between 10 and 100	67	52	58	59
Between 100 and 500	7	18	21	15
500 and more	13	12	21	15
Total	100	100	100	100
Shanghai				
Less than 10	5	-	-	2
Between 10 and 100	25	55	67	45
Between 100 and 500	25	44	27	29
500 and more	45	1	6	22
Total	100	100	100	100

Table 16: Age of Company as of 2003

	High-tech	KIBS	Media/Content	Overall
Beijing				
Less than 5 years old	47	55	47	50
Between 5 to 10 years old	27	20	20	22
Between 10 to 20	13	20	27	20
More than 20 years old	13	5	6	8
Total	100	100	100	100
Shanghai				
Less than 5 years old	43	56	35	42
Between 5 to 10 years old	33	44	45	40
Between 10 to 20	24	-	20	18
More than 20 years old	-	-	-	-
Total	100	100	100	100

Location Choice of Firms

This section highlights the factors that a firm considers when it makes the decision to locate its operations in a particular location. During the interviews, we inquired about the factors at the neighborhood level and on a larger geographical scale concerning regional differences between the two cities.

Forty-eight firms in Beijing and 40 firms in Shanghai responded to the inquiry on their initial location decisions. The majority of respondent firms in Beijing did not consider other locations apart form Beijing when making their initial location decision, while much larger

proportion of firms interviewed in Shanghai said they considered other cities in China as alternatives to Shanghai, as seen in Table 17.

Table 17: Location initially considered before locating in the city (% of respondents)

	High-tech	KIBS	Media/Content	Overall
Beijing				
No other location considered	80	78	87	81
Other location considered	20	22	14	19
Cities in China	13	6	7	8
Cities outside China	7	17	7	11
Total	100	100	100	100
Shanghai				
No other location considered	43	33	42	40
Other location considered	57	67	58	60
Cities in China	57	67	58	60
Cities outside China	-	-	-	-
Total	100	100	100	100

This difference mainly comes from the greater involvement of foreign partners in Shanghai than in Beijing in our sampled population. Foreign companies tend to compare several cities before making the location decisions, while local entrepreneurs are highly embedded in their residential cities. The territorial ties matter even when entrepreneurs come back from overseas to establish businesses in their home country. As an entrepreneur in Zhangjiang High Tech Park declared, he didn't consider other locations because he had lived in the city before was familiar with the local environment, and had the support of relatives and friends; moreover, he was attracted also by the open market policy and the preferential treatment provided by the government.

Table 18 shows the main reasons for choosing current location when the decisions were originally made. Forty-nine companies in Beijing and all in Shanghai responded to this question. In Beijing, the largest number of high-tech manufacturing companies took government policies as the main reasons for their location decision; for KIBS, the most important reason was linked to client relationships; and content producers located in Beijing mainly because the founders were from the city. Overall, the market factor is most important among the reasons for locating in Beijing. Firms in Shanghai cited quite varied reasons for the location decisions, with no

particular reason being remarkably important in all three categories. The market factors and client relationship are slightly more important than other items.

Table 18: Main reason for locating in the city (%)

	High-tech	KIBS	Media/Content	Overall
Beijing				
Home-base	29	5	53	27
Infrastructure	14	25	7	16
Hub	14	15	7	12
Proximity to markets/production base	22	35	33	31
Client relationship	14	60	27	37
Culture amenity	14	25	13	18
Government	43	-	7	14
International city	-	5	7	4
Exposure	-	-	-	-
Other	7	30	27	22
Shanghai				
Home-base	29	-	20	18
Infrastructure	14	-	5	8
Hub	10	11	20	14
Proximity to markets/production base	24	33	30	28
Client relationship	19	22	30	24
Culture amenity	5	11	10	8
Government	24	22	10	18
International city	10	33	15	16
fouse by media	10	11	15	12
other	29	67	30	34

Note: The percents may not add to 100% as multiple responses are included.

Table 19 shows how the firms assessed the business environment of their current locations when the interview was conducted. Most of the firms were satisfied with their current locations for business purposes. Some firms considered relocating elsewhere, but do not intend to move away, but to find a better location within the same city.

Table 19: Beijing and Shanghai as location today (%)

	High-tech	KIBS	Media/Content	Overall
Beijing				
Satisfied with current location in Beijing	87	65	60	70
Intend to relocate elsewhere	13	35	40	30
Total	100	100	100	100
Shanghai				
Satisfied with current location in Shanghai	90	78	90	88
Intend to relocate elsewhere	10	22	10	12
Total	100	100	100	100

Table 20 shows the reasons for relocating for those firms which intended to relocate elsewhere. It seems that cost factors are more crucial in Shanghai than in Beijing, particularly for business services companies. Some firms were being induced to relocate due to the urban renewal project of the city, that is, the buildings they are working in will be pulled down. Quite a few respondents said they considered investing in new facilities because their business was growing. And when making decision on the location of new facilities, many firms consider their options elsewhere in China.

Table 20: Reasons to relocation (%)

	High-tech	KIBS	Media/Content	Overall
Beijing				
Cost factors – relocate to cheaper areas	-	29	-	13
Market factors – relocate to access large emerging market	50	29	-	20
Resources – manpower, talents	50	-	33	13
Other reasons	-	57	67	67
Shanghai				
Cost factors – relocate to cheaper areas	21	100	40	46
Market factors – relocate to access large emerging market	26	-	40	26
Resources – manpower, talents	-	-	20	26
Other reasons	53	-	-	-

Note: the denominator in calculate percentage is the number of firms that intended to relocate elsewhere, and percent may not add to 100% as multiple responses are included.

Firms in Knowledge Economy

Knowledge workers

The knowledge workers are the most important resources in sustaining knowledge-based firms. Table 21 shows the responses to the question whether the supply of knowledge workers constrains the development of the firm. For high-tech manufacturing and knowledge intensive businesses, this issue is more serious in Shanghai than in Beijing. But for media and content producers, we find a reverse result. The reason is that media and content industries are more competitive in Beijing than in Shanghai. Firms find that the supply of knowledge workers is a real issue because they have to compete with peer firms to attract capable workers. The high mobility of employees made companies reluctant to invest in skills.

Table 21: Supply of knowledge workers (%)

Is the supply of knowledge workers constraining the development of the firm?	High-tech	KIBS	Media/Content	Overall
Beijing				
No	47	50	33	44
Yes	53	50	67	56
Total	100	100	100	100
Shanghai				
No	34	33	75	50
Yes	66	67	25	50
Total	100	100	100	100

Fifty-two percent of sampled firms in Beijing and 58% in Shanghai complained that the scarcity of a critical skill has hampered the growth of the firm. The large majority of the firms which lacked a necessary skilled workforce tried to look for a worker with such skills within the local or regional market. There are more firms in Shanghai that are ready to hire expatriates with the critical skills they needed (see Table 22).

Table 22: Characteristics most likely source of critical skill workers

	Percentage of the firms who answer "yes" when being asked "Is the supply of knowledge workers constraining the development of the firm?"
Beijing	
National from local market	61
Expat from local market	8
National from regional market	38
Expat from regional market	8
National from N.America/Europe	4
Expat from N.America/Europe	-
Shanghai	
National from local market	65
Expat from local market	21
National from regional market	31
Expat from regional market	3
National from N.America/Europe	14
Expat from N.America/Europe	10

Note: percent may not add to 100% as multiple responses are included.

Table 23: Substitution of skills scarce in local market by using workers from elsewhere

Has the firm tried to substitute for the skills that are scarce in local market by using workers available in other cities?	High-tech	KIBS	Media/Content	Overall
Beijing				
No	40	50	33	42
Yes	60	50	67	58
Total	100	100	100	100
If yes, success of arrangement is rated as	4.1	3.9	3.8	3.9
Shanghai				
No	24	33	30	28
Yes	76	67	70	72
Total	100	100	100	100
If yes, success of arrangement is rated as	4.1	2.7	4.6	4.2

Measured on a Likert scale of 1 (not at all) to 5 (very well)

Overall, 58% of companies in Beijing and 72% of companies in Shanghai have employed people from other regions to substitute for local skills, which are scarce in the cities (See Table 23). The high percentage of employment from outside is partly due to the household registration system in China, because many workers working and living in the cities don't have permanent resident permits. Generally, this arrangement was satisfactory, except for KIBS firms in Shanghai. Firms in high-tech manufacturing and content production in Shanghai hired more workers from the outside than those in Beijing.

Table 24: Way to ensure a greater supply of knowledge workers

	Percentage of respondents
Beijing	
Human resource development	42
Culture of openmindedness and creativity	2
Development of market	4
Attract foreign talents	-
Willingness to pay for resources	14
Other	38
Shanghai	
Human resource development	48
Culture of openmindedness and creativity	26
Development of market	6
Attract foreign talents	6
Willingness to pay for resources	36
Other	16

Note: percent may not add to 100% as multiple responses are included.

In order to ensure a greater supply of the critical skills in the local market, human resources development is crucial both in Beijing and Shanghai (cited by 42% in Beijing and 48% in Shanghai, see Table 24). However, many respondents criticized the education system in China for lacking efficiency in professional skills training. Firms in Beijing also provided many comments on the institutional and governance reform to remove the constraints on creativity. Many firms in Shanghai suggested that suitable rewards were crucial to attracting talents.

Table 25: Special Challenges involved in managing knowledge workers

	Percentage of respondents
Beijing	
No	42
Yes	58
Special Challenges:	
Organizational challenges	8
Need for innovation	4
Managing relationship	18
Need for flexibility	-
Other	28
Total	100
Shanghai	
No	28
Yes	72
Special Challenges:	
Organizational challenges	20
Need for innovation	8
Managing relationship	14
Need for flexibility	16
Other	2
Total	100

Note: multiple responses are included in each item under special challenges.

Fifty-eight percent of firms in Beijing and seventy-two percent of firms in Shanghai acknowledge that managing knowledge workers involves special challenges (see Table 25). The most frequently mentioned internal challenge involves managing relationships with the knowledge workers, for knowledge workers with higher creativity propensities are more independent and have their own opinions. The organizational challenge exists to provide incentives for the knowledge workers to be innovative in work. The most frequently mentioned external challenge for managing knowledge workers, both in Beijing and Shanghai, is the high mobility of capable talents. The firms face difficulty in retaining a stable work force due to increasing competition between peer firms to bid away capable staff. What's more, the most innovative employee has a high propensity for leaving the company to setup his/her own firm, which becomes a potential competitor of the former company. Some interviewees complained that they couldn't benefit from the investment in human resources development. However, many interviewees enjoy working with innovative people. Some of them stated proudly that, for a

capable leader, managing innovative knowledge workers is not hard but an interesting experience.

The most commonly cited organizational arrangement suggested to facilitate management of knowledge workers is working in teams (about 78% of respondents in Beijing and 74% in Shanghai, see Table 26). Firms also pointed to the need for flexibility, especially for innovators, such as the designers, software developers. However, although some firms have used telecommuting, most of interviewees didn't like such arrangement, for face-to-face communication is still important in coordinating different missions and generating good ideas.

Table 26: Organizational arrangements to facilitate management of knowledge workers

	Percentage of respondents
Beijing	
Working in team	78
Flexi-time	20
Telecommuting	12
Company culture	2
Rewarding on performance	6
Other	4
N.a	6
Shanghai	
Working in team	74
Flexi-time	40
Telecommuting	8
Company culture	4
Rewarding on performance	-
Other	-
N.a	-

Note: percent may not add to 100% as multiple responses are included.

Business services needed for innovation

High quality business services are critical for improving business efficiency. Generally, firms complain that the business services are not well developed in China. Beijing and Shanghai are much better compared with most other cities in China, but still lag far behind cities in advanced regions, such as Hong Kong, Tokyo, Singapore, etc.

Marketing services (including advertising and public relation management services) are among the most critical for firm growth (citied by 46% of respondents in Beijing and 56% in Shanghai, see Table 27). Most firms interviewed are focused on the domestic market in the mainland and outsource their marketing services. The foreign companies have to study the

uniqueness of Chinese market, and keep good relations with the Chinese government, while the small local companies have to search for partners to help market their services and products.

The demands on business services are much more diversified in Beijing than in Shanghai. Consulting (26%) and legal services (18%) followed marketing as the second and third most important services for the growth of firms in Beijing, while R&D, financial services, logistics, education/training, IT services, and so on also being addressed by our interviewees. Besides marketing, supporting services widely needed in Shanghai are concentrating in several sectors, i.e., R&D (42%), consulting (34%) and logistics (34%). Firms in Shanghai also mentioned other services, including quality control, testing, and industrial design.

Table 27: Business services which are most critical for the viability and growth of firms

	Percentage of respondents
Beijing	
R&D	14
Marketing	46
Financial/accounting	12
Legal	18
Human resources management	16
Consulting	26
Logistics	8
Education/training	4
IT services	8
Other	10
Shanghai	
R&D	42
Marketing	56
Financial/accounting	0
Legal	2
Human resources management	0
Consulting	34
Logistics	34
Education/training	0
IT services	0
Other	30

Note: percent may not add to 100% as multiple responses are included.

Table 28 shows the assessment of the availability and quality of the service sectors identified as critical to the growth of firms. Although firms in Beijing and Shanghai complained about the overall business supporting services in the cities, they felt that is was quite easy to look for the services that are critical to business (all rates are higher than 3.0). The number of firms in

several service sectors, such as marketing/advertising, consultant, legal services, IT services, accounting, etc., has increased quickly in recent years. However, the rates on quality are comparatively lower. Many firms were reluctant to outsource critical services, such as R&D and accounting, because they are not satisfied with the services provided outside, and afraid that the service providers cannot guarantee to protect their valuable commercial secrets. Still, quite a lot companies tried to outsource more services, currently provided in-house to reduce cost and improve business efficiency. Most of firms acknowledged that the quality of services is getting better.

Table 28: Assessment of these business services: availability and quality

	Beijing		Shanghai	
	Availability	Quality	Availability	Quality
R&D	3.9	3.7	3.4	3.4
Marketing	3.6	3.3	3.4	2.9
Financial/accounting	4.2	3.5	-	-
Legal	4.1	3.4	-	-
Human resources management	3.5	3.8	-	-
Consulting	3.5	3.1	3.5	3.0
Logistics	3.3	2.8	3.1	3.0
Education/training	3.0	3.0	-	-
IT services	3.9	3.1	-	-

Note: Measured on a Likert scale of 1 (very difficult/very poor) to 5 (very good/very poor)

Cluster Economies

The cluster economies refer to the geographical concentration of firms in the same and related industries that can generate spillover benefits.

We asked two questions to identify whether cluster economies exist in each category of innovative industries (see Table 29**)**. The cluster economy is most significant in media and content industries in both cities, and most insignificant in knowledge intensive business services.

As for high-tech manufacturing companies, we also asked whether their suppliers in this city are part of industrial clusters of their own (see Table 30). The majority answered “no” (Beijing 67%, Shanghai 43%). Most of IT firms in Beijing have their suppliers in southern China. And firms in Shanghai often have their manufacturing suppliers in the suburbs of Shanghai or other cities in the Yangtze River Delta.

Table 29: Geographical concentration and clusters of innovative industries

	High-tech	KIBS	Media/ Content	Overall
Beijing				
Are peer firms concentrated in a particular part of the city?				
No	33	65	33	46
Yes	67	25	67	50
No opinion	-	10	-	4
Total	100	100	100	100
Does the respondent consider the firm interviewed to be a part of a cluster?				
No	40	40	20	34
Yes	60	55	80	64
Not clear	-	5	-	2
Total	100	100	100	100
Shanghai				
Are peer firms concentrated in a particular part of the city?				
No	29	56	30	34
Yes	67	33	55	56
No opinion	4	11	15	10
Total	100	100	100	100
Does the respondent consider the firm interviewed to be a part of a cluster?				
No	38	22	25	30
Yes	52	56	70	60
No opinion	10	22	5	10
Total	100	100	100	100

Table 30: Suppliers of high-tech manufacturing

Are any of the suppliers in this city part of business clusters of their own?	High-tech
Beijing	
No	67
Yes	13
No opinion	20
Total	100
Shanghai	
No	43
Yes	33
No opinion	24
Total	100

Intellectual Property Law

Intellectual property rights are important to the knowledge-based economy for they endow the intangible assets of knowledge and innovations with measurable property ownership, which facilitate transactions of such assets. However, intellectual property law (IP law) can

protect only some (not all) of knowledge-based outputs. The government of China has invested heavily to educate the domestic producers and consumers to understand the importance of protecting intellectual property rights. And the public is increasingly aware of their IP rights in business. But as we indicated above, a gap still persists between the protection that the IP law system can really provide and the expectations of individuals.

Table 31 shows the extent of firms' involvement in production covered by IP law. There is great disparity between sample firms in the two cities. Overall, a large majority of firms in Beijing (92%) consider that they produce output covered by IP law, much higher than firms in Shanghai (63%). All the high-tech manufacturing firms and content industry in Beijing do so, while this proportion is less than 1/3 in Shanghai. The proportion of firms producing IP protected output is slightly lower in the KIBS sector in Beijing, at 80% of the firms, while in Shanghai only 6% do. Therefore, firms in Beijing also generally lead Shanghai in the following three items within this table.

Incidence of licensing IP to others is highest in the content industries, with 93% of firms in Beijing and 20% in Shanghai having done so.

The percentage of firms that have been involved in disputes pertaining to IP is much larger in Beijing (66%) than in Shanghai (6%). This is because some kind of outputs are more vulnerable to IP right infringement, such as popular software for personal users, books, audios and videos, which are more frequently produced by interviewees in Beijing than in Shanghai. In Beijing, a relatively high proportion of firms in high-tech sectors (40%) and the media content sector (40%) have been involved in disputes pertaining to IP, compared to 15% in the knowledge intensive business services. In the high-tech manufacturing sector, disputes arise over the misuse of trademarks, and unauthorized application of patent technologies. In the creative content industries, most firms complained that pirates reaped the majority of profits that they should have earned.

Overall, 88% of firms in Beijing and 64% of firms in Shanghai are actively seeking outputs that can be protected by IP law at present. This propensity is higher in high-tech manufacturing and creative content sectors than in KIBS sector both in Beijing and Shanghai.

Table 31: Extent of firms' involvement in production covered by IP law

	High-tech	KIBS	Media/ Content	Overall
Beijing				
% of firms that produce output covered by IP law	100	80	100	92
% of firms license IP to others	40	65	93	66
% of firms involved in dispute pertaining to IP	40	15	40	30
% of firms seeking innovation that can be protected by IP law	93	75	100	88
Shanghai				
% of firms that produce output covered by IP law	32	6	30	68
% of firms license IP to others	14	6	20	20
% of firms involved in dispute pertaining to IP	4	-	2	6
% of firms seeking innovation that can be protected by IP law	34	4	26	64

Table 32 shows the major constraints to seeking innovative products covered by IP law in Beijing and Shanghai. Overall, 12% firms in Beijing (all of which are in KIBS sector, 30%) and 6% in Shanghai (all of which are high-tech manufacturing firms, 14%) do not feel that there are any major constraints to seeking innovations covered by IP law.

Among the firms that do face constraints, the limited protection afforded by laws for innovation in process and business systems was the most often mentioned constraints in all three sectors both in Beijing and Shanghai. This reflects the gap between the protection that the IP law system can really provide and the expectation of firms and innovators. The definition between lawful and unlawful activities is very unclear in practical terms, particularly in the creative content industries. A creative idea could be very critical to a design, but can hardly get effective protection under the IP law. The dynamic of technology, particularly in information technology sector, also discourages firms to use patents to protect their innovation, for the application process is so time consuming that when the firm finally get the patent, the technology could be out of date.

Cost constraints were not an issue because only a few interviewees had been really involved in the patent application process or a lawsuit related to IP. Actually, most of interviewees intended to avoid being involved in an IP lawsuit considering the high cost, even when they know of the existence of an unlawful copy of their innovative products. And more firms in Shanghai than in Beijing addressed the issue of resource shortages, such as the lack knowledge of IP and limited manpower.

Table 32: Major constraints to seeking innovative product covered by IP law

	High-tech	KIBS	Media/Content	Overall
Beijing				
None	-	30	-	12
Cost constraints				
Cost involved in getting IPR	7	5	13	8
Difficulty to achieve successful commercialization of IPR	-	-	-	-
Legal issues				
Enforcing IP law	7	5	13	8
High cost in lawsuit	-	15	-	6
Limited laws for innovation in process and business systems	13	25	53	30
Resource shortage				
Lack of knowledge of IP	7	5	-	4
Limited manpower	7	5	-	4
Shanghai				
None	14	-	-	6
Cost constraints				
Cost involved in getting IPR	-	-	*5*	*2*
Difficulty to achieve successful commercialization of IPR	*5*		*10*	*6*
Legal issues				
Enforcing IP law	-	*11*	-	2
High cost in lawsuit	-	-	*5*	2
Limited laws for innovation in process and business systems	*19*	*11*	*10*	14
Resource shortage				
Lack of knowledge of IP	*12*	-	*10*	*10*
Limited manpower	*24*	-	-	*10*

Table 33: Elements most needed for ensuring an effective IP law regime

	High-tech	KIBS	Media/Content	Overall
Beijing				
Improving the IP law system	13	15	27	18
Strengthen the enforcement	67	20	60	46
Improving the business ethics	33	40	13	30
Shanghai				
Improving the IP law system	43	22	30	34
Strengthen the enforcement	62	11	55	50
Improving the business ethics	19	-	15	14

Note: percent may not add to 100% as multiple responses and no opinions are included.

Table 33 shows the suggestions for the elements that are needed most at present for ensuring an effective IP law regime in Beijing and Shanghai. Overall, firms in both cities most frequently selected to strengthen the enforcement of the IP law (cited by 46% firms in Beijing,

and 50% in Shanghai). This is particularly true in high-tech manufacturing and creative content sector. Quite a few firms in the KIBS sector in Beijing called for improving the business ethics, for it is particularly difficult to protect innovation in this sector through IP law.

Cities in Knowledge Economy

Generally, Shanghai is more efficient than Beijing from a business point of view according to the responses of the sample firms. As Table 34 shows, 78% of firms in Shanghai ranked the city efficient or very efficient, while only 40% in Beijing ranked the city efficient. No firms in Shanghai considered the city very inefficient, but 2% firms, all of which are high-tech manufacturers, ranked Beijing very inefficient.

Table 34: Rank of business efficiency (Percentage of respondents)

How to rank the efficiency of the city from a business point of view?	High-tech	KIBS	Media/Content	Overall
Beijing				
Very efficient	7	5	-	4
Efficient	20	40	47	36
No opinion	66	45	53	54
Inefficient	-	10	-	4
Very inefficient	7	-	-	2
Total	100	100	100	100
Shanghai				
Very efficient	28	-	15	18
Efficient	38	89	70	60
No opinion	28	11	15	20
Inefficient	6	-	-	2
Very inefficient	-	-	-	-
Total	100	100	100	100

Generally speaking, firms in both cities rank the property of the city they are living in to be innovative and attractive to knowledge-based firms and industries, and no firms ranked cities "very low" in this question (see Table 35). Particularly, all sample firms of creative content sector in Beijing consider this city will be the most attractive to creative industries in China, while firms in high-tech manufacturing and in KIBS ranked Shanghai higher than Beijing.

Table 35: Rank of prospects to be an innovative city (Percentage of respondents)

The chance of city becoming a center for knowledge-based firms and industries within this decade	High-tech	KIBS	Media/Content	Overall
Beijing				
Very high	40	30	20	30
High	46	45	80	56
No opinion	7	10	-	6
Low	7	15	-	8
Very low	-	-	-	-
Total	100	100	100	100
Shanghai				
Very high	62	22	45	48
High	24	67	25	32
No opinion	14	11	5	10
Low	-	-	20	8
Very low	-	-	-	-
Total	100	100	100	100

Table 36: Aspects of efficiency

	High-tech	**KIBS**	**Media/Content**	**Overall**
Beijing				
Public services	2.8	2.4	2.6	2.6
Communication facilities	3.3	3.1	3.1	3.1
Transportation system	1.8	1.6	1.9	1.7
Law and order	2.7	2.7	2.7	2.7
Public health	2.7	2.4	2.5	2.5
Crisis	2.2	2.0	2.0	2.1
Disaster management	1.9	2.1	2.1	2.0
Regulatory framework	2.6	2.9	2.4	2.7
Zoning	2.5	2.4	2.5	2.4
E-governance	2.7	2.5	2.3	2.5
Shanghai				
Public services	3.2	2.8	3.1	3.1
Communication facilities	3.4	3.1	3.3	3.3
Transportation system	2.6	2.1	2.3	2.3
Law and order	2.7	2.8	2.5	2.7
Public health	3.0	2.9	3.3	3.1
Crisis	3.1	2.8	2.5	2.8
Disaster management	3.2	2.8	2.7	2.8
Regulatory framework	3.2	2.9	2.7	2.9
Zoning	3.6	2.8	2.9	3.1
E-governance	3.4	2.7	2.7	2.9

Note: outstanding=4, adequate=3, inadequate=2, seriously inadequate=1

Table 36 shows the ranking of efficiency from a business point of view by firms in Beijing and Shanghai. Overall, firms in Shanghai ranked almost all items higher than those in Beijing, except law and order. Transportation was most unsatisfying in both cities because the

number of private cars have increased dramatically in recent years in large cities of China, over burdening the urban transportation system.

Public health, crisis, and disaster management was ranked low in Beijing because this survey was conducted shortly after the outburst of SARS in China, raising the public consciousness.

There is no significant disparity in the assessment of each aspects of efficiency within the three sectors in Beijing. However, high-tech manufacturing firms in Shanghai rank higher in most items than firms from the other two sectors (only law and order, public health as exceptions).

Table 37: Innovation infrastructure

	High-tech	KIBS	Media/Content	Overall
Beijing				
Research institutes	2.9	3.0	2.9	3.0
Supply of knowledge workers	2.9	2.8	3.1	3.0
Competitive markets	2.6	2.6	2.5	2.6
IP law framework	2.3	2.5	2.5	2.5
Global linkages	3.0	3.1	3.3	3.1
Venture capital	2.4	2.2	2.2	2.3
Business related services	2.3	2.7	2.7	2.6
Information access	3.0	3.2	3.0	3.1
Tolerance of Diversity	2.9	3.1	2.7	2.9
Transparency	2.3	2.5	2.3	2.4
Shanghai				
Research institutes	3.3	2.8	3.0	3.1
Supply of knowledge workers	3.5	3.0	3.8	3.5
Competitive markets	3.1	2.9	2.8	2.9
IP law framework	2.4	2.2	2.3	2.3
Global linkages	3.9	3.4	3.8	3.7
Venture capital	2.9	2.4	2.5	2.7
Business related services	3.1	3.0	2.6	2.9
Information access	2.3	3.1	3.3	2.9
Tolerance of Diversity	3.7	3.0	2.9	3.2
Transparency	2.9	2.6	2.3	2.6

Note: outstanding=4, adequate=3, inadequate=2, seriously inadequate=1

Table 37 shows the ranking of the innovation infrastructure by firms in Beijing and Shanghai. Shanghai receives higher rates than Beijing in most items. It's surprising that the firms in Beijing ranked the research institutes and supply of knowledge workers in Beijing lower than their counterparts in Shanghai. Concentration of research institutes and talents with higher education are viewed as the key advantages of Beijing in developing a knowledge-based economy. However, many firms, especially SMEs, complained that they benefit little from these

R&D resources, and current higher education system could hardly provide the qualified knowledge workers they most needed.

Shanghai was ranked the higher in global linkages. This is in line with the image of the international city that the Shanghai government has tried to project to the world. Beijing was ranked the highest in information access in all items because of its central political position in China, which is critical to the national and economic decision making process.

The competitive market was ranked low in both cities, as markets for innovative industries are new and still underdeveloped in China; however, many firms consider that the emerging market could be both a challenge and an opportunity for them. Two important elements in the development of innovative industries, IP law framework and venture capital, were inadequate both in Beijing and Shanghai. Firms also felt that the business related services and transparency also needs improvement.

Over 80% of firms perceived the need for specific investments to attract knowledge workers with a global demand in both Beijing and Shanghai, as shown in Table 38 and Table 39, but the items that firms addressed needed are quite different. Preferential policies such as tax incentives, and efficient transportation system were most needed in Beijing, while improvement in living conditions, education/training, and venture capital are most needed in Shanghai.

Firms also discussed broadly other issues, such as the reform of household registration system in China, the freedom of individuals, the reform of institution and governance, and the culture encouraging entrepreneurship and tolerating failures.

Table 38: Investments needed to attract and retain knowledge workers

Are specific investments needed to attract and retain knowledge workers with a global demand?	High-tech	KIBS	Media/Content	Overall
Beijing				
No		20	13	12
Yes	93	75	87	84
Yes and No	7	5	-	4
Total	100	100	100	100
Shanghai				
No	24	22	10	18
Yes	76	78	85	80
Yes and No	-	-	5	2
Total	100	100	100	100

Table 39: Investments needed to attract and retain innovative people

% of respondents	Beijing	Shanghai
No	12	18
Yes	84	80
Yes and No	4	2
Type of investment:		
Education and training	2	18
Venture capital and funding	6	16
Preferential policies	28	6
Improvement of living condition	12	20
Transparent regulation environment	4	6
Efficient transportation system	18	8
Cultural amenity	6	2
Other	24	16
Total	100	100

VII. Conclusions

As two of the most important cities in China, Beijing and Shanghai are both facing internal and external pressure to be more innovative to sustain urban growth. But they face great challenges in their efforts to build endogenous innovation capability.

Beijing and Shanghai each has different competitive advantages embedded in various geographical and historical contexts. Our survey rated both cities highly in the Chinese context of becoming an innovative city within this decade.

As the national capital, Beijing has unique advantages in developing knowledge intensive industries. With abundant academic think-tanks, universities, research institutes and R&D centers, Beijing is ahead of Shanghai in terms of size and overall research strength. Beijing has established its position as the national IT center, boasting the highest amount of Internet surfers and domain names among cities in China. Swift exchange of information concerning national policy and financial decisions is crucial for the survival and development of enterprises relying on rapid information delivery, such as the telecommunications and IT industries. Moreover, Beijing is well positioned as the nation's political policy making and cultural center and to spur the development of high-tech and knowledge-based service industries, such as marketing, consulting, accounting and law.

Although appearing to keep a lower profile than Beijing in terms of endogenous technological innovation, Shanghai could take the lead in high-tech manufacturing and business services to serve the solid regional industrial base. As the top financial center, most of our interviewees were of the view that Shanghai provides a better business environment for enterprises and inducement for overseas investors. As China's traditional commercial hub and manufacturing center, Shanghai is the leading city in the current competition for inducing investment from global business firms. The city is now striving to perfect its metropolis image, and to outpace Beijing in terms of attracting foreign direct investment.

Urban policy targeting creativity and innovative capacity

Innovative industry has been playing an increasingly important role in sustaining urban growth in post-modern cities. The emerging innovative industries in Beijing and Shanghai, though small at present, are dynamic, and are receiving great attention from both the central and

local government. The municipal authorities of Beijing and Shanghai have done a lot to improve the innovation environment of the cities, including investing heavily in urban infrastructure, building e-government to improve efficiency of administration, reducing tax burdens and providing incentives for high-tech companies or investing in R&D, improving enforcement of intellectual property laws, relaxing the household registration system so that local firms can hire talent coming from overseas and other regions of China. But certain elements still stunt the growth of innovative industries.

For Beijing, the advantage of R&D resources is still constrained by the inefficient system of state-owned research institutes. And the creative content producers are subject to many restrictions. For Shanghai, the pursuit of innovative capacity has to be balanced with other social objectives, such as creating jobs to reduce unemployment in the wake of state-owned enterprise reforms, reducing income disparities among different classes of citizens. Innovative entrepreneurs in both cities have to struggle in an immature market, where the norms, regulations, and business ethics are all under developed.

International experience shows that agglomeration economies are an attractive force to innovative firms because they are crucial for their competitive advantage. However, as our survey shows, local interaction is inadequate in the knowledge-based industrial clusters in both Beijing and Shanghai. Most of the software and IC design companies interviewed in Beijing and Shanghai have been aware of the spatial clusters of peer companies; however, they don't feel there was much cooperation among local peer firms, instead, they complained about the fierce competition. The survey found that the clustering of the firms was due to the attraction of preferential policies and because the government or state-owned enterprises' purchase of large amounts of IT products for the financial system, the e-government system, the electrical power system, the telecommunication system, etc. The efficiency of innovative industry in Beijing and Shanghai is still weak. Future progress calls for better living conditions and a business environment attractive for creative talent and entrepreneurs. Only when general living conditions improve can innovative industries find wider space for growth.

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